



HPD L15A7

Engine Installation Manual

Van Diemen Chassis



Table of Contents

1. Safety Consideration and Warnings	Page 2
2. Title Page	Page 3
3. Bell Housing Adapter Preparation	Page 4
4. Oil Tank Preparation	Page 6
5. Slave Cylinder Installation	Page 7
6. Fuel System Installation	Page 10
7. Engine Installation	Page 16
8. Oil System	Page 21
9. Cooling System	Page 23
10. Miscellaneous	Page 26
11. Completed Installation	Page 28
12. Bleeding The Cooling System	Page 30
13. Engine Cover Installation	Page 32
14. Contact Information	Page 36

Safety Precautions

The service information in this manual is intended for use by qualified, professional technicians. Attempting service or repairs without the proper training, tools and equipment could cause injury or death to you and others. It could also cause damage to the engine / vehicle or create an unsafe condition.

This manual describes the proper methods and procedures for the race kit installation related to your chassis, in addition to service and repair procedures described in the Honda Fit service manual. Some procedures require the use of specifically designed tools and dedicated equipment. Any person who intends to use a replacement part, a service procedure, or a tool that is not recommended by Honda or the race sanctioning body, must determine the risk to their personal safety, and the safe operation of the vehicle. Any error or oversight while performing this conversion or service can result in faulty operation, damage to the vehicle, or injury to yourself, or others.

Proper service and maintenance are essential to the racer's safety and the reliability of the race car. If you need to replace any parts, always use the correct parts supplied by Honda Performance Development, Inc. or American Honda Motor Co., Inc. Do not use inferior quality or unapproved parts.

Because this manual is intended for professional technicians, we do not provide warnings for basic shop safety practices – for example, hot parts = wear gloves. If you have not received shop safety training or do not feel confident about your knowledge about safe servicing practices, we recommend that you do not attempt the procedures described in this manual. We cannot warn you of every conceivable hazard that can arise in doing service and repair procedures. Only you can decide whether or not you should do a given task.



WARNING

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Carefully follow the procedures and precautions in this manual and other service material.



WARNING

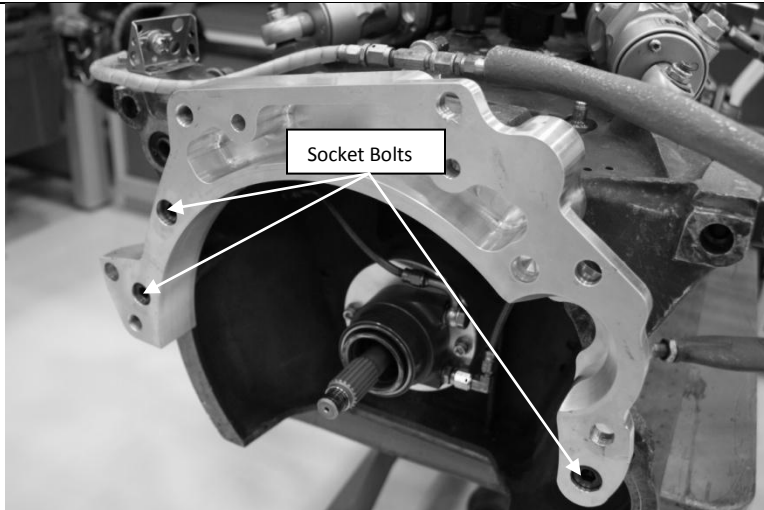
Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Carefully follow the procedures and precautions in this manual.

This manual details the steps necessary to install the Honda L15A7 engine with the HPD engine kit into a circa 1999-2008 Van Diemen chassis. The converted L15A7 engine is designed to be installed utilizing the existing mounting points of your chassis without modification.

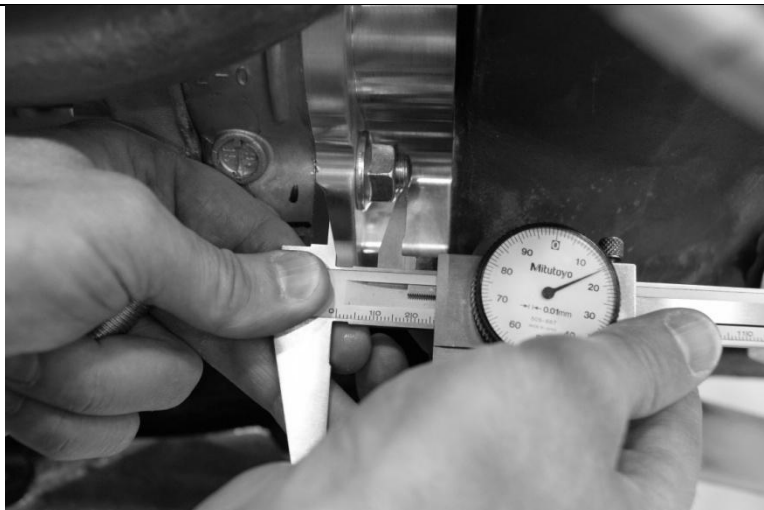
Bell Housing Adapter Preparation

1. Adapter Plate
2. 12 x 55mm stud
3. Bell housing dowel (2x)
4. 12 x 28mm stud
5. 12mm Flange Nut (2x)
6. 14 x 20mm dowel pin
7. 12 x 60mm flange bolt (2x)
8. 10 x 25mm flange bolt
9. 10 x 40mm flange bolt
10. 3/8"-16 x 3" socket bolt
11. 10 x 1.5 x 50mm socket bolt (3x)

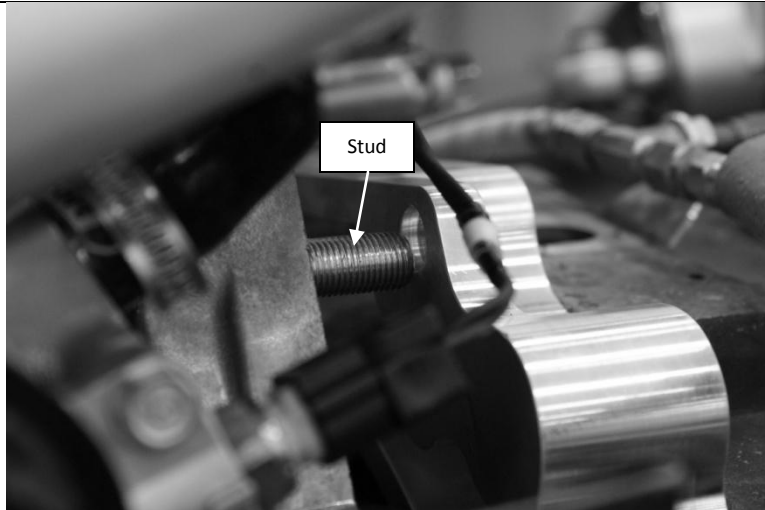


Install the locating dowels.

Using the three 10 x 1.5 x 50mm socket bolts, attach the adapter plate to the bell housing.



On the engine side, install the 12 x 55mm stud in the lower starter mount. Install it so that 27mm of the stud protrudes from the block surface. Use thread retaining compound to hold it in place. Do not bottom the stud. Doing so will prevent the flange nut from achieving full engagement on the stud.

Bell Housing Adapter Preparation cont'd

Install the 12 x 28mm stud in the upper left threaded hole. Bottom fit the stud using a thread retaining compound.

Oil Tank Preparation

Optionally, the oil tank cover can be modified - like the one in the picture - to reduce oil splash and foaming.



Install oil tank cover using existing hardware and an RTV-type sealant.



Install the standard Van Diemen pickup tube/filter assembly in the lower right side of the oil tank. Alternatively, fit the HPD-supplied 90-degree AN fitting as illustrated here.

Install Slave Cylinder



HPD adapter and mounting bolts with washers.



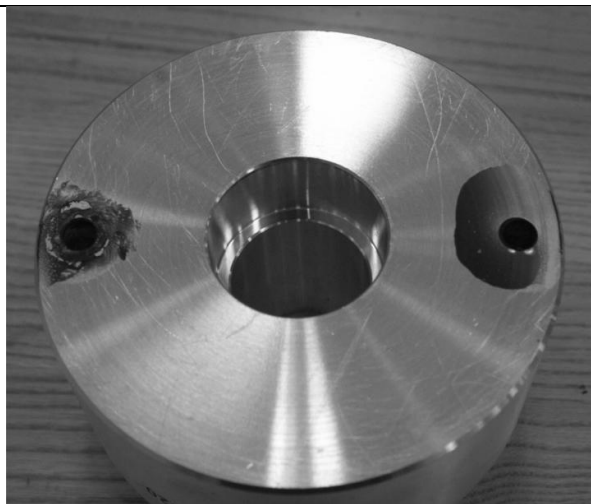
Remove the existing clutch release bearing, slave cylinder and input shaft.

It is suggested that the input shaft seals be upgraded / replaced at this time.

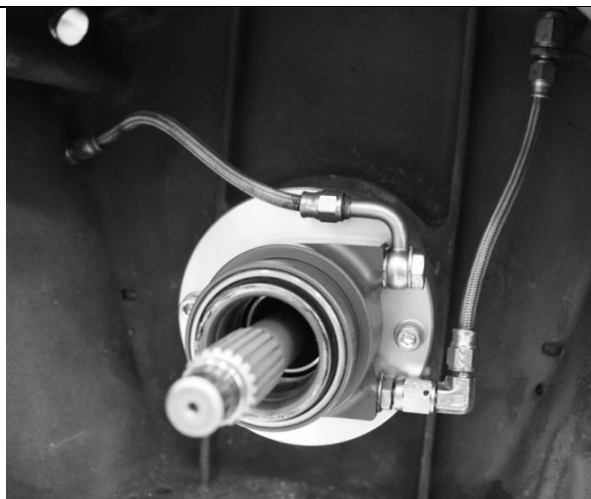
Prior to installing the slave cylinder adapter, place the supplied O-ring on the existing slave cylinder mount.



Installed O-ring.

Install Slave Cylinder, cont'd

On gearbox side of adapter, apply a thin film of sealant around the mounting holes prior to installation.



Install the slave cylinder, connect the hydraulic lines and install the input shaft.

Clutch Slave Cylinder Placement

1. Measure the distance from the back of the engine block to the end of the clutch fingers. This is dimension "A"
2. Place a straight edge across the front of the bell housing and measure from the straight edge to the mounting surface of the slave cylinder. This is dimension "B".
3. With the slave cylinder compressed into the bore, measure the installed height of the slave cylinder. Add 4.0mm to this dimension for freeplay. This will be dimension "C".
4. Use the following equation to determine the proper slave cylinder spacer length. $B - C - A = \text{XX}$ spacer length.

Install Slave Cylinder, cont'd



Install the HPD Van Diemen input shaft, supplied with the chassis kit. Follow the procedure as outlined in the Hewland LD200 transmission and Van Diemen chassis manuals.

Refer to the appropriate manual for your type of gearbox for proper installation.

Install Fuel System



The Fit Fuel system consists of the fuel pump, fuel filter, regulator, assorted fittings and hoses. If you are using your own hose supply, ensure that it is rated for high pressure fuel injection systems. The HPD-kitted fuel system runs at 50-60 psi. The feed hose needs to be rated at a minimum of 150 psi.



Remove the regulator from the kit.

Discard the ring, the small O-ring and the small clip.



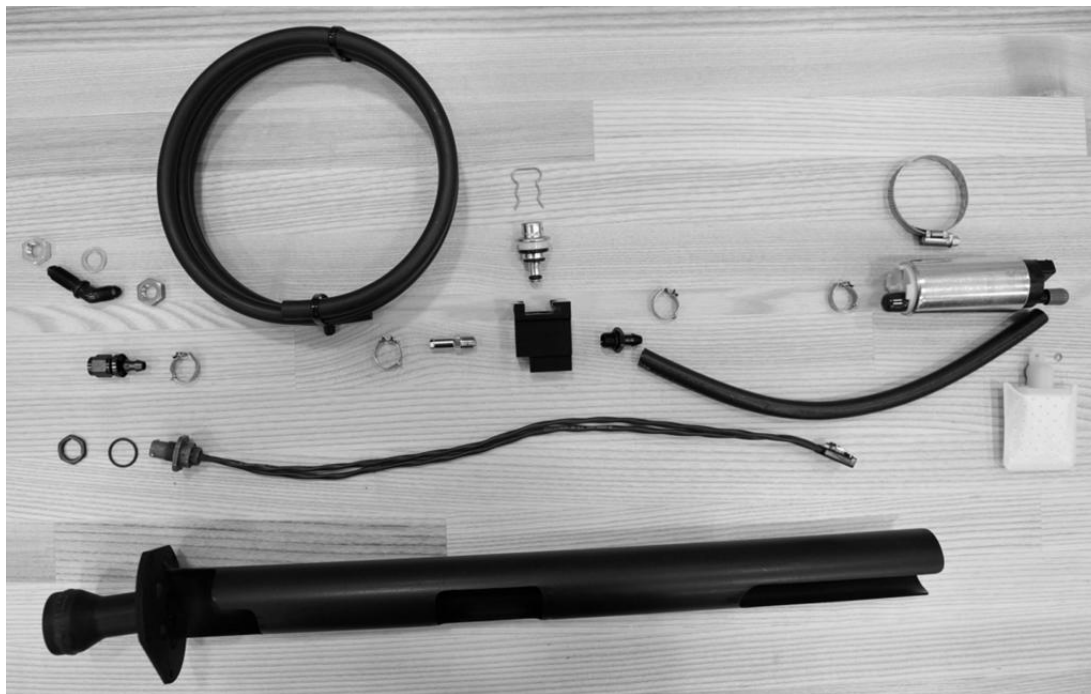
In preparation for installation of the L15A7 Honda engine, an inspection of the engine bay frame rails and the fuel cell is recommended.

Fuel cell foam should be inspected for age and degradation, while the bladder also should be carefully examined for wear, punctures, tears or signs of leaks.

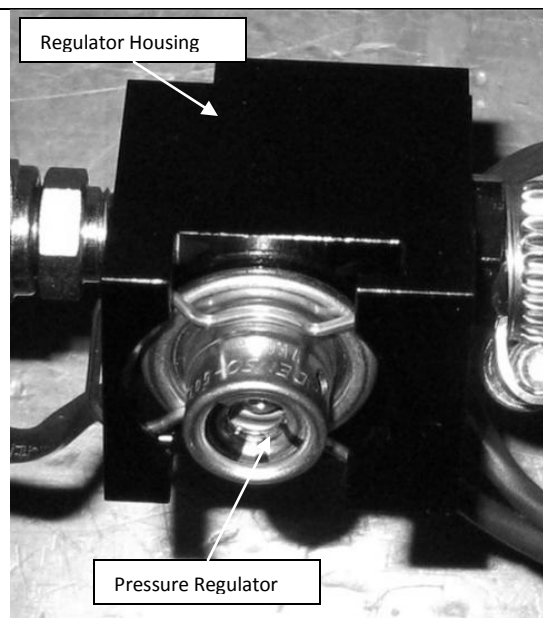
The fuel cell container also should be inspected and any sharp edges, screw/rivet heads, etc., either removed or covered by a protective material.

Thoroughly clean the cell before assembly.

Install Fuel System cont'd



HPD's Van Diemen Fuel System Components



Install the regulator into the housing using a light oil or silicone lubricant on the O-rings.

Make sure to insert the regulator square, as it will be easy to cut the O-rings.

It will take some force by hand to install the regulator.

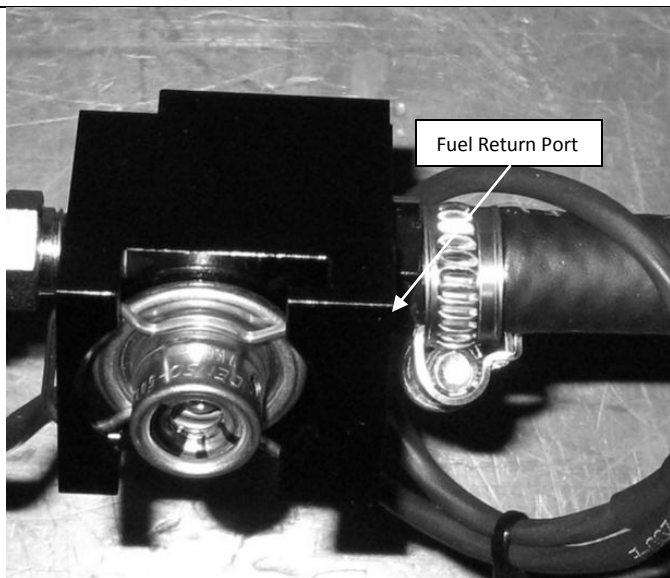
Install the retainer clip into the housing.

Install Fuel System cont'd

Using the pipe thread sealant, install the 1/8" NPT to 5/16" barb into the housing, on the fuel cell (bottom) side. This will connect to the fuel pump.

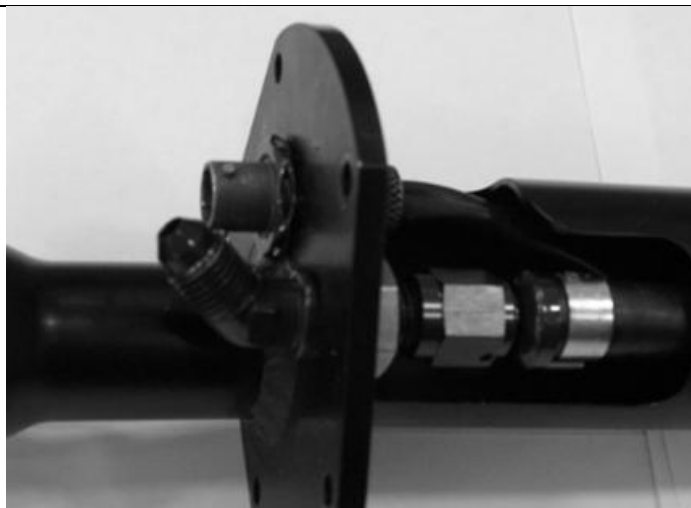


Using pipe thread sealant, install the 1/8" to 5/16" barb into the housing on the cover (top) side



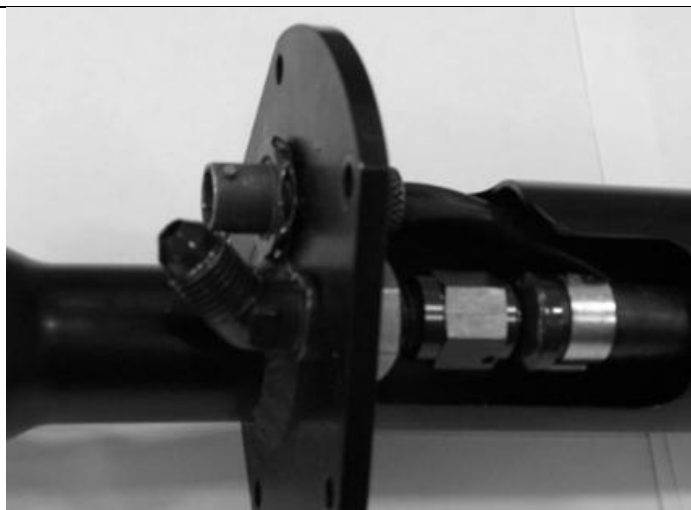
Position the housing so the return fuel port faces toward the bottom of the fuel cell.

NOTE: Be sure the regulator is sending excess fuel back into the tank (down) and not into the cover (up).

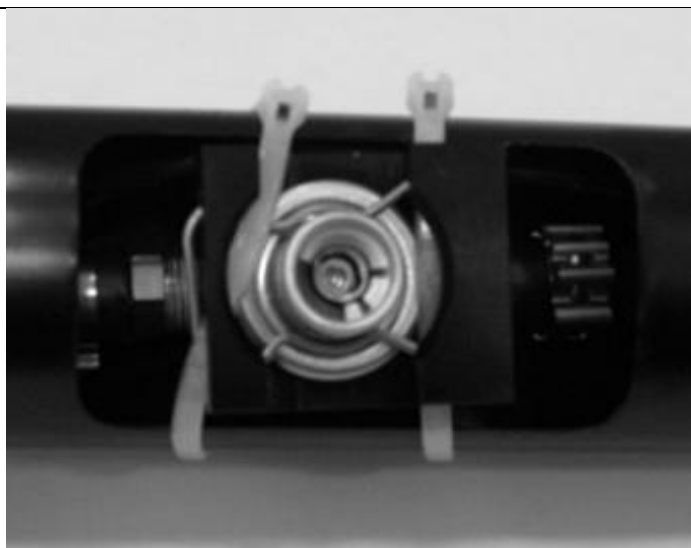
Install Fuel System cont'd

Install the fuel pump harness into the AN-6 hole. Ensure the O-ring is in place on the **bottom** side of the plate.

Snug down the connector



Install the AN-4, 45° bulkhead fitting onto the plate. Looking from the rear of the car, rotate fitting to the 10 o'clock position.



Cut the top internal fuel hose to 140.3mm, then install it onto the barb fitting on the regulator. Install clamp.

Position the fuel pressure regulator assembly in middle cutout of fuel fill tube.

Install the AN-4 female hose fitting into the fuel hose. Secure with clamp.

Install onto bulkhead fitting.

Secure regulator housing with the supplied Ty-raps.

Install Fuel System cont'd

Install sock filter onto the pump. Use a 1/4" socket to push the filter locking ring onto the pump. Installing the filter in this manner will require cutting the filter from the pump to remove it in the future.

****Alternatively****, the post can be cut off of the pump to cut a 3mm thread with a tap. Use a 3 x 4mm bolt to attach the fuel filter to facilitate ease of removal and installation for maintenance and replacement.



Position the fuel pump in the fuel fill tube and secure with hose clamp. Check its position in the fuel cell with the sock filter in place. A 5mm standoff from the bottom of the fuel cell to the filter is desirable.

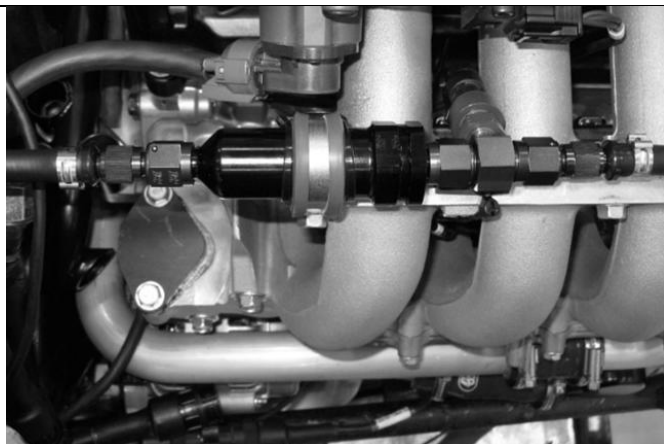
Tighten hose clamp around fuel tube and fuel pump.

After the fuel pump position is set, measure for the second, lower internal fuel hose and cut to needed length for the distance between the regulator and fuel pump. Use supplied clamps to secure hose ends onto fittings.



Install fuel fill tube assembly into fuel cell; install the fuel filter sock onto the fuel pump.

NOTE: Do not run the fuel system without the filter sock installed!

Install Fuel System cont'd**Fuel filter mounting**

Pictured is a proposed fuel filter location and mounting method.

NOTE: The optional fuel pressure sensor will fit between the #1 & #2 intake runners.



Install the fuel feed line onto the fuel cell cover and route the same as the original. This will connect to the fuel filter with another 45° degree push-loc.

Cut the hose to length and install.

Install the third 45° push-loc onto the supplied hose.

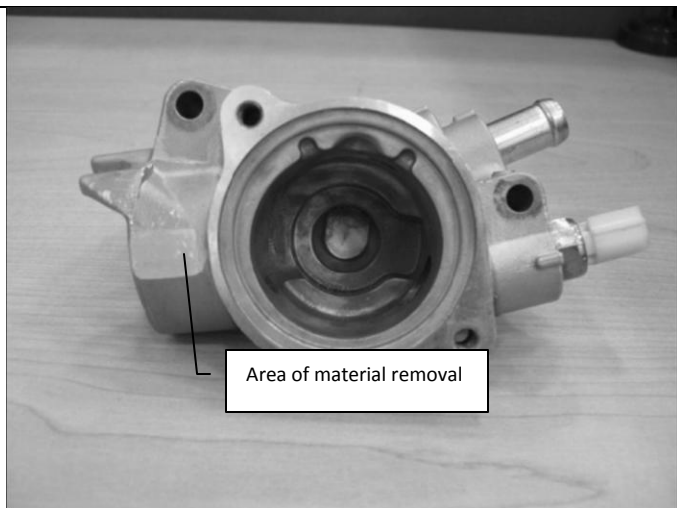
Connect this to the 'vent' fitting on the fuel cell cover, route it the same as the fuel feed line.

NOTE: You will need to supply your own vent check valve.

Route the hose as normal.

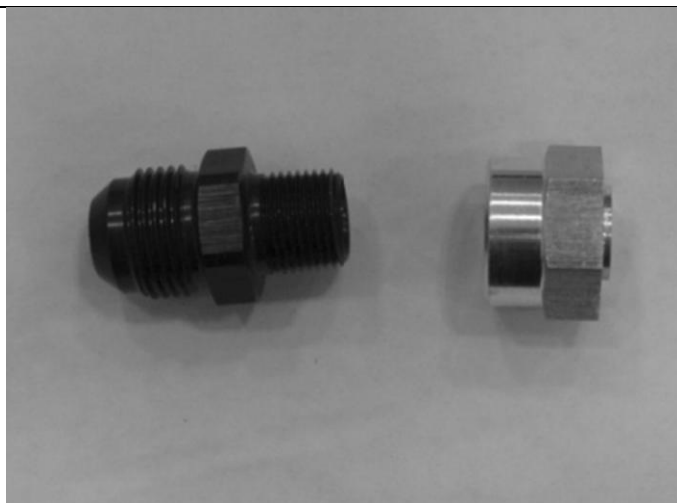
Engine Installation

The water inlet at the thermostat housing needs to use an alternate thermostat cover. The cover clocks the water line at 90° from standard, parallel to the ground.



Area of material removal

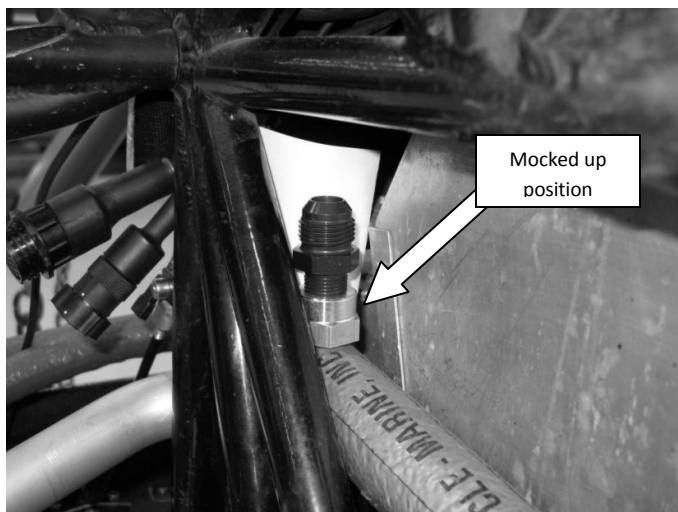
The thermostat housing will require some material removal to facilitate the water hose clamp. Be careful not to remove too much material.



A 3/8" NPT bung is supplied in the Van Diemen chassis kit. This will be welded to the stock cross-over tube to allow running of an air bleed line to the supplied header tank.

Engine Installation cont'd

Measure 2 3/4" from the outside of the main chassis down tube, be sure you will have access to tighten the fitting and hose.

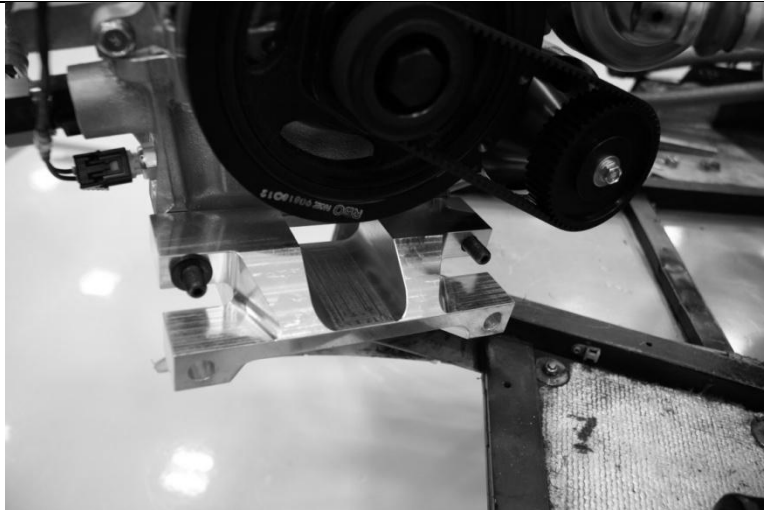


NOTE: Before cutting the AN-10 bleed hose to length, it is recommended to mock up the header tank to confirm the length is correct. This will account for any deviations in the placement of the bung.



Thread the 3/8" x -10 fitting into the bung, using pipe sealant. Cut the -10 hose to the length determined in the previous step, then install the straight and 45° fittings.

Engine Installation cont'd



This engine will install in the same manner as your previous engine.

Be sure the water lines are installed on the engine per the engine race kit manual.

Install the lower front engine mount to the oil pan.

Washers are included in the kit to help with any shimming that may be required. If needed, they are to be placed between the mount and the frame member.

Note: The frame mount holes are 7/16" diameter, rather than the stock Van Diemen 10mm. This is to facilitate installation into a variety of chassis. You may need to install reducing sleeves in the bores.



Note: This engine mount also comes with oversize (7/16") bores. This is to facilitate installation in all chassis. You may need to install reducing sleeves to achieve the stock 10mm sizing of the Van Diemen

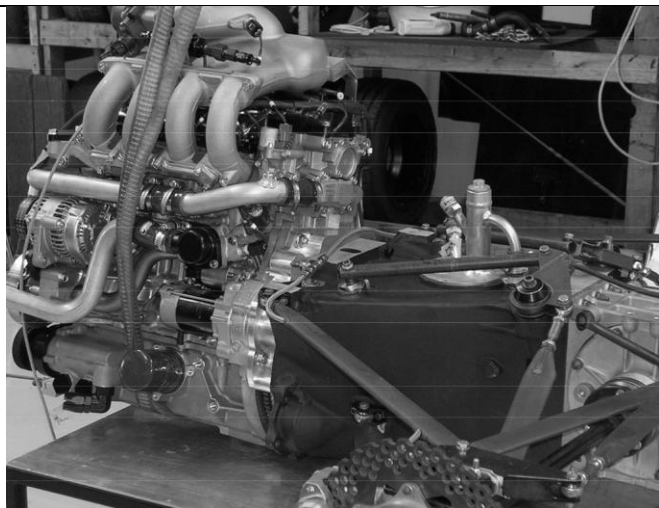
Have the upper mount loosely in place until the frame rails, bell housing and front lower mount are all in place, then shim the upper mount **at the chassis attachment points** as necessary.



Apply a small amount of anti-seize to the splines of the input shaft.

Ensure the lower rear mount studs are in position and not binding.

Introduce the bell housing assembly onto the engine.

Engine Installation cont'd

Align the input shaft splines with the clutch and mate the bell housing to the engine.

When you have the dowels engaged, you can thread in all fasteners and snug up the bell housing.

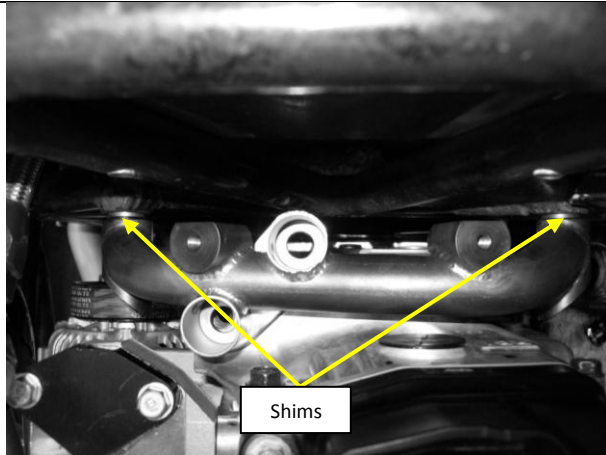


Once the engine/transaxle assembly is in position, secure the engine bay frame rails to the oil tank/transaxle assembly.



Secure the front lower engine bolts. If necessary, use hardened washers as shims, installed between the motor mount and the frame rail.

Follow the Van Diemen instructions for shimming and squaring the chassis.

Engine Installation cont'd

You also may need to shim the upper front mount with washers (six hardened, 2.5mm thick washers are included in the chassis kit).

Note: The mounting bracket and/or washers may need to be modified to a specific chassis. Use caution in making any modifications as the coolant header tank sits on this bracket.

Oil System



Layout all the hose and fittings before assembly to understand how the hoses are to be placed.

NOTE: If you are cutting the braided hose to length and installing the fittings yourself be sure you are familiar with the proper procedures. If not done correctly you could cause damage or harm to yourself or others.



The oil feed is on the lower right side of the chassis, running from the tank to the right front corner of the sump. These are both AN-10 fittings.

There is an in-line filter included in the Chassis Kit. This should be incorporated into the oil feed line. Be sure it is installed in the correct direction.



The oil return line is an AN-12, located at the bottom of the scavenge pump. If you run an oil cooler, run the line from the scavenge outlet to the front cooler inlet, then run a second -12 line from the cooler exit to the return pipe located at the top of the oil tank as illustrated above. If you run without an oil cooler, run the return line from the scavenge outlet directly to the return pipe located at the top of the oil tank.

Oil System cont'd

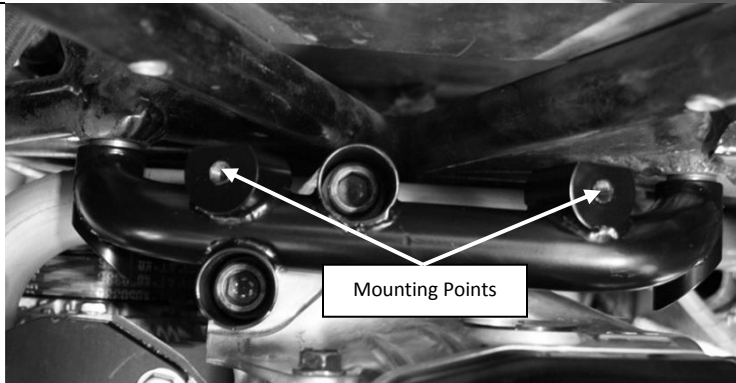
Install the two breather lines, one from the cam cover to the return tank, and the other from the rear of the tank filler neck to the rear reservoir.

Be sure the 2mm breather restrictor is installed in the cam cover where the breather hose connects.

Cooling System



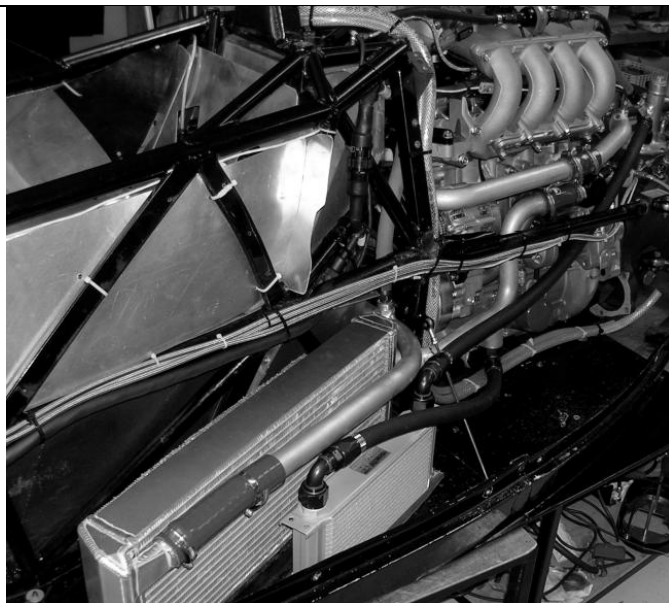
Install rubber grommets with steel top hat bushings into mounting points of coolant overflow tank.



Mounting Points



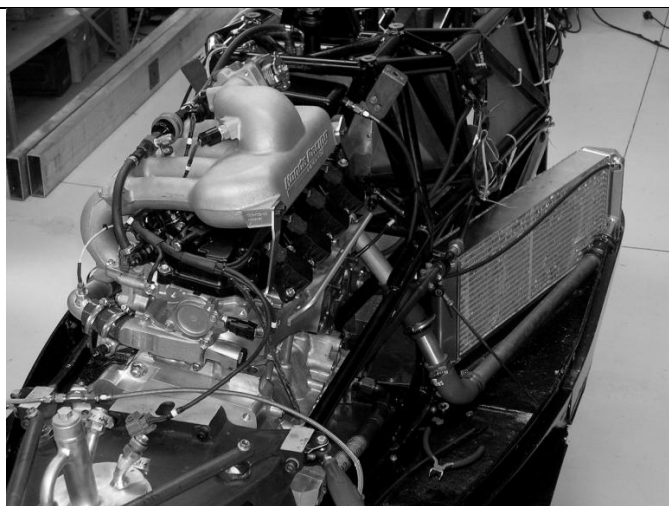
Install coolant overflow tank onto upper front engine mount.

Cooling System cont'd

The left side water lines are routed as follows: Use the blue 135° hoses and water pipes provided. Refer to the photos below and illustration:

From the stock Van Diemen crossover pipe to the top front left radiator inlet; also run a -10 hose from the crossover pipe up to the header tank.

From the rear left radiator outlet to the engine water inlet thermostat housing.



The right side water lines are routed as follows:

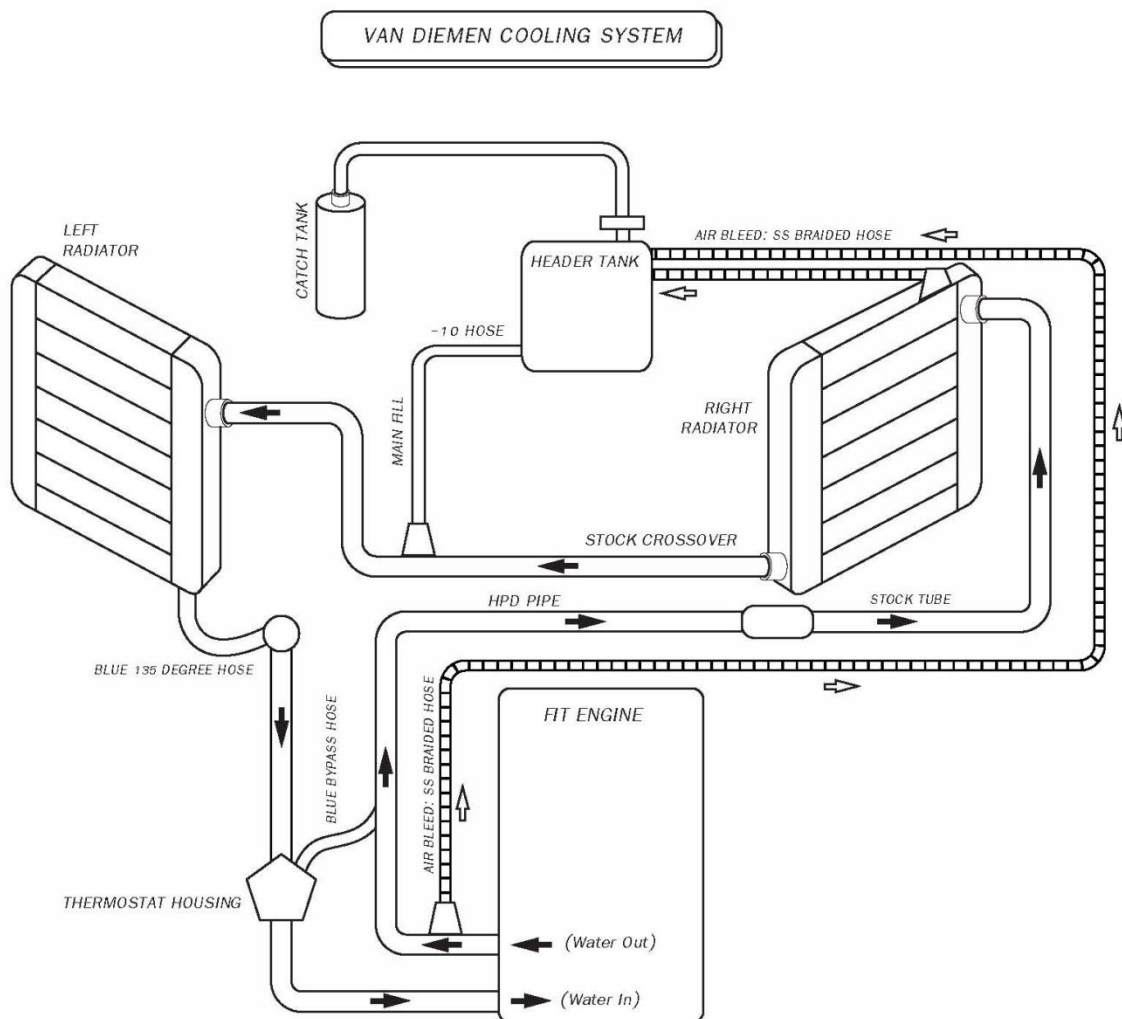
From the stock Van Diemen crossover pipe to the rear right radiator inlet.

From the front right radiator outlet, using the stock Van Diemen tube to the water outlet on the cylinder head.

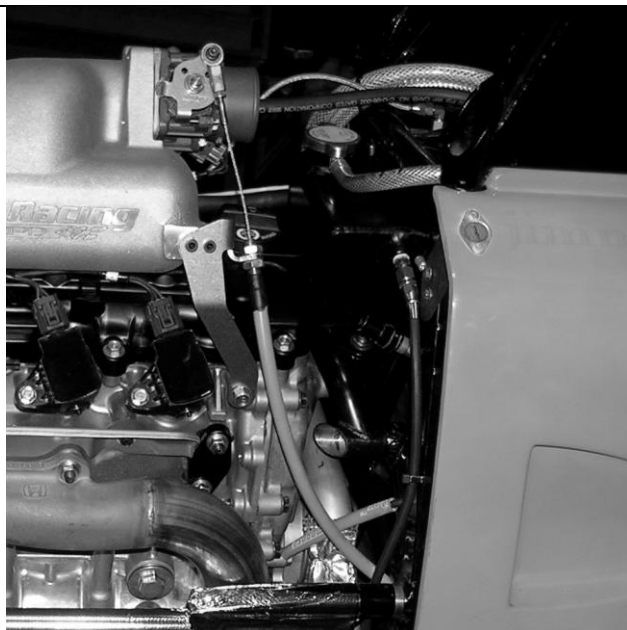


Install a bleed line from the top of the right radiator to the header tank.

Cooling System cont'd



Miscellaneous



Install the throttle cable.

Use the method described in the Race Engine Assembly manual (pg 48) to set full throttle.

Performance Tip:

Be sure your throttle pedal stop is strong enough to withstand the force of your foot.

The pedal should not be able to rock side-to-side on its pivot point, as this will lead to premature cable wear and inconsistent full throttle applications.



Install the exhaust system. Attach the oxygen/Lambda sensor on the primary pipe as illustrated below. Consider the use of heat insulating tape and materials in sensitive areas such as the oil inlet line.

Install the oxygen/Lambda sensor per the Honda Fit service manual. Plug into the engine harness.



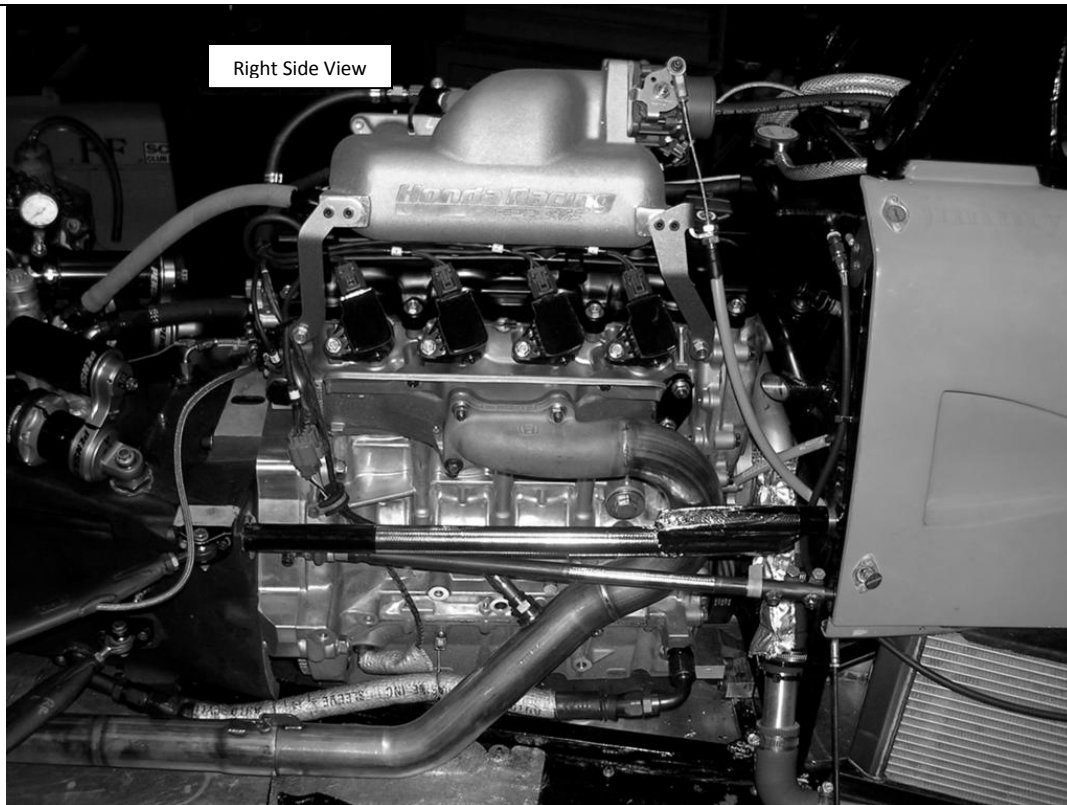
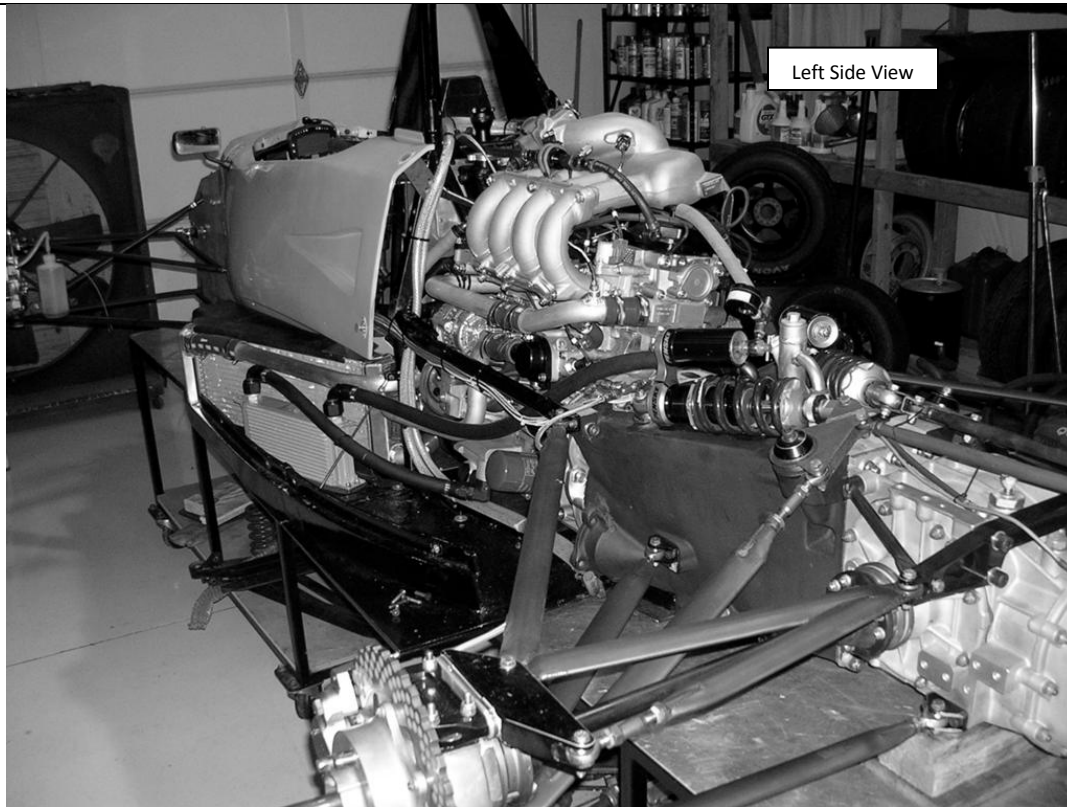
Depending on your previous exhaust system, you may have to modify the rear exhaust hanger or fabricate a new one.

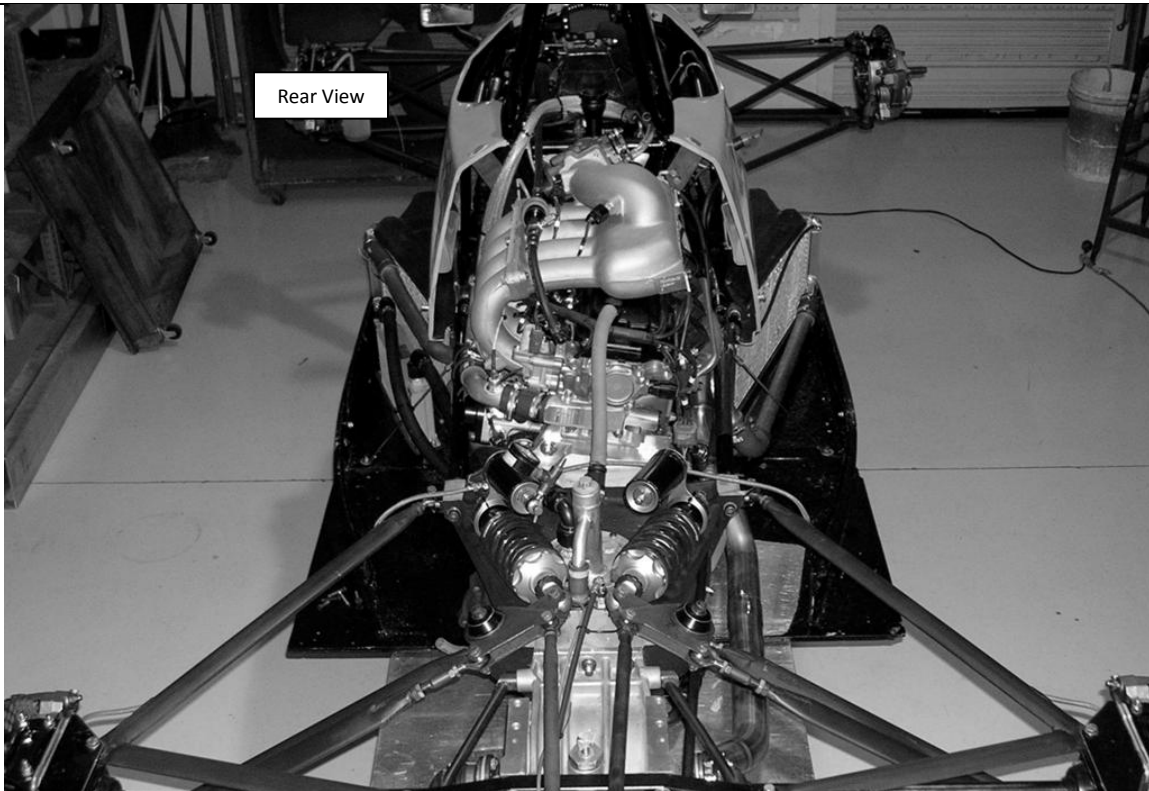
Miscellaneous cont'd



Install the middle shift rod; tighten all bolts and check that you can select all gears.

Completed Installation



Completed Installation cont'd**Installing fluids:**

The oil system will hold the same volume as your previous engine did.

We recommend that you prime the oil and fuel systems before starting your L15A7 engine for the first time.

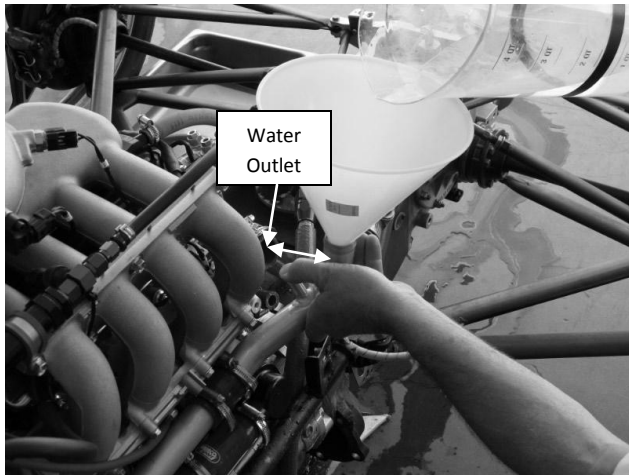
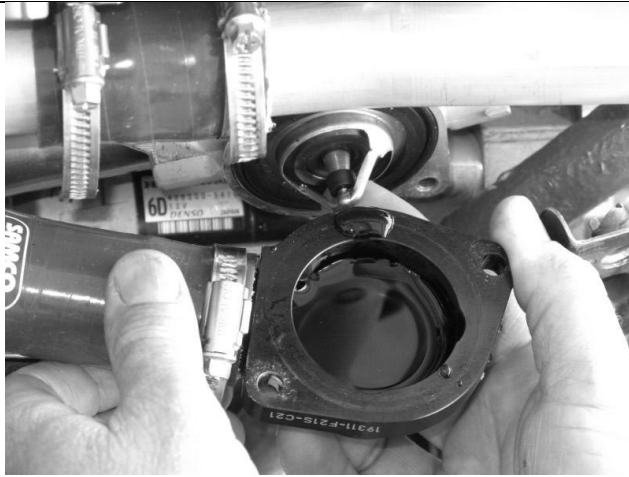
See 'Operating Parameters' section of your L15A7 Engine Kit Assembly Manual.

NOTE: HPD recommends installing a 19-20psi radiator cap.

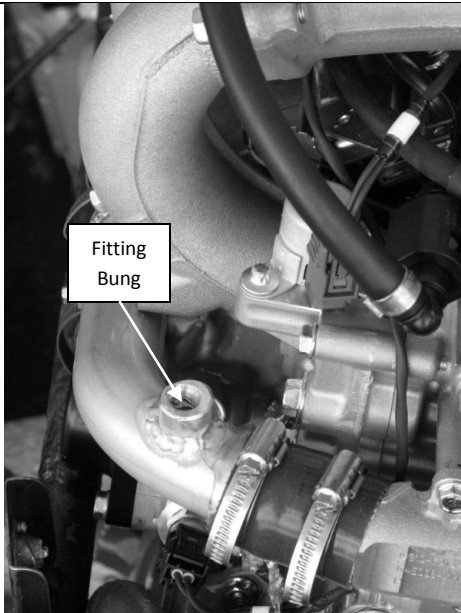
Follow the Honda Fit Service manual guidelines for all fluid recommendations.

Connect the brake and clutch lines. Bleed the systems as normal.

Bleeding The Cooling System



If the water system is completely dry, it is best to refill the system from the inlet (thermostat cover) and the water pipe coming from the outlet (back of the head). Fill with distilled water. This will push the air up into the header tank. When water is seen at the end of the tubes, reconnect them in their proper position.



Loosen the 1/8" plug on the upper rear water pipe. This will let air escape during the burping process.

As an option, you can install a -3 hose back to the header tank as a permanent, running bleeder.

Bleeding The Cooling System cont'd

Fill the header tank and run the engine up to 175° Fahrenheit. This will allow the thermostat to open. At this point you should see air bubbles in the header tank.

NOTE: Be cautious when looking in the header tank, hot water can discharge from the filler neck. Rev up the engine to burp out any remaining air.

Shut off engine and fill header tank with distilled water. Secure the cap and close the plug at the upper rear water pipe. If you still see air and the engine temp is climbing above 200° Fahrenheit, shut the engine off and let it cool down.

Then proceed to start up and bring engine temp up to 175° Fahrenheit and burp the system again.

Engine Cover Installation

By Stan Clayton
Dauntless Racing Cars, February 2010

Safety Precautions

Personnel undertaking this procedure should read and understand all relevant MSDS documents before using resins, hardeners, catalysts and solvents, as they can be hazardous to one's health. Use appropriate safety equipment at all times while working with these materials, with a minimum of long sleeves, protective gloves, respirator and eye protection.

This set of instructions presumes the reader is familiar with basic composites work. Read and understand all steps of this procedure before starting it. If you doubt that you can correctly complete the task, do not hesitate to have an experienced composites shop complete it for you.



WARNING

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.



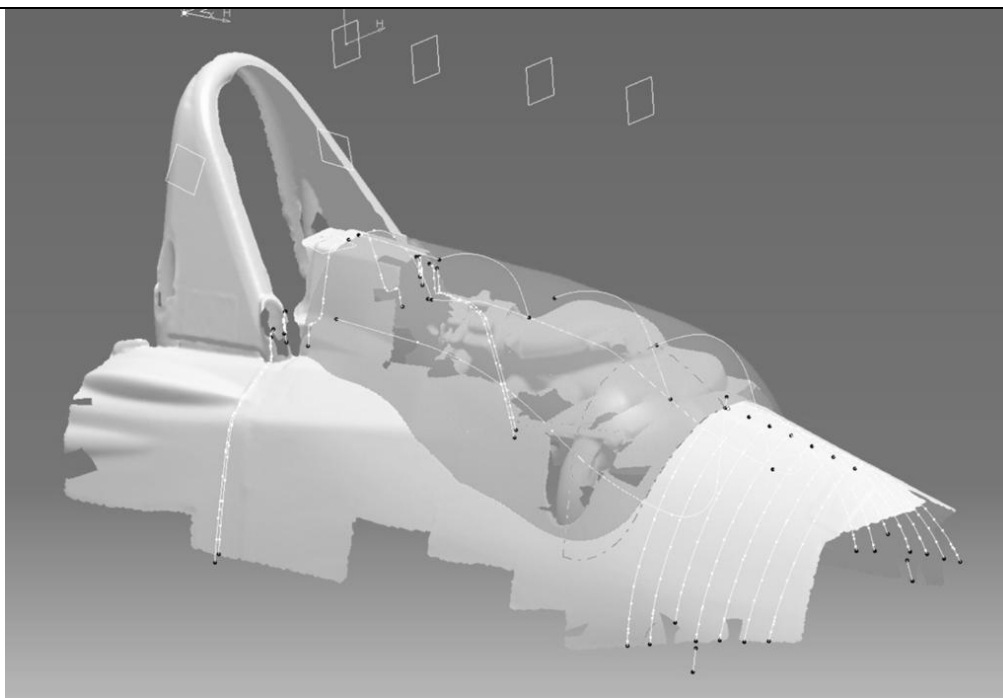
WARNING

Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

Engine Cover Installation cont'd**Modifying an existing Kent or Pinto tail:**

The simplest modification is to simply create clearance openings for the Honda intake manifold and throttle assembly. Install a cover plate, made from sheet stock (aluminum, fiberglass, etc) over the air intake used in the previous (Kent, Pinto) application.

Engine Cover Installation cont'd**Installing the HPD intake on a Zetec tail section:**

A more complete solution is to install the air intake supplied with the HPD Chassis Kit to a Zetec-style tail section. The Zetec tail is preferred as it presents a slimmer cross section – without the side bulge required for the carburetor/intake manifold clearance required by the Kent or Pinto (F2000) tails. Follow these steps to make the installation:

- Before removing material from the standard Zetec tail, test fit the HPD air intake and make your initial outlines for removing material from the top/sides of the tail section. **Be careful not to remove too much material!** It is better to make an initial, smaller-than-required opening and then trim to fit. Go slowly and trim just a bit of material each time to prevent over-trimming. The air intake also may be **slightly** trimmed to provide the best possible fit.
- Once trimming of the Zetec cover is complete, test fit it to your chassis with the HPD L15A7 engine installed. Ensure there is the necessary clearance for the intake manifold, throttle linkage, air filter, etc.
- Trace a line around the opening approximately 2" outside the trimmed edge of the hole. Scrub the area with acetone to remove all traces of dirt, grease and oil. It is critical to a successful installation that all traces of dirt, oil and grease be removed from this area, or the new resin will not properly adhere. Next, using a sanding block with medium grit paper or a die grinder and flap wheel, abrade the surface inside the 2" line down to raw resin and/or glass. Remove just enough material to get clean resin/glass. Don't grind through to the surface! Once the sanding is complete, vacuum the area to remove the dust. Lightly abrade the inner face of the blister to ensure a fresh bonding surface.

Engine Cover Installation cont'd

- Place the trimmed air intake on the fiberglass cloth you will use to make the bonding patch. Trace a line approximately 1.5" outside the air intake's outline and cut the fabric to match the line, then cut out a matching outline approximately 1.5" inside the outline of the air intake. You will now have a shaped piece of fiberglass cloth approximately 3" wide. Repeat the process to produce two more pieces, approximately 2" wide and 1.5" wide. All three layers can be the full width, but narrower strips will save a little weight. Three layers should do the job, but you may add additional layers if you wish, so long as they do not conflict with the engine installation.
- It is now time to fit the air intake to the tail section and tape the outside with 2" masking tape. Ensure the entire outside outline of the opening is covered with masking tape, or resin may leak out onto the outer surface of the side cover. You may also wish to tape the air intake in place with additional pieces of tape running fore and aft and up and down on the outside of the tail.
- With the air intake securely taped in place (tape ONLY on the OUTSIDE surface!), place the tail section upside down on a soft mount that will support the tail without distorting it. You are now ready to bond the air intake in place.
- Ensure the resin and hardener/catalyst and tail section are at or above the minimum working temperature of the resin. Wear all appropriate safety gear and measure out the resin and hardener. The tail section is made with epoxy resin, but satisfactory patches can be had with vinylester or polyester resins, as well. Resin dye may be added to match the color of the patch to the color of the side cover resin. Resin dyes suitable for all resin types may be purchased at: Tap Plastics: <http://www.tapplastics.com/shop/product.php?pid=50&>
- Once again clean the sanded inner surfaces of the side cover and blister with acetone on a paper towel and let it dry while mixing the resin and hardener thoroughly. When the acetone is evaporated and the resin and hardener are thoroughly mixed, brush a light layer of resin over the sanded and cleaned surfaces, allowing the resin to fill the gap between the side cover and the blister. Place the widest patching layer carefully in place, distributing it evenly inside and outside the outline of the blister. Using the brush, gently wet it out with resin and work out any air bubbles or creases in the fabric so it lies flat to the surface. When the widest layer is wetted out, carefully place the next smaller layer on top of it and wet that layer out. Alternatively, you may start with the narrowest layer; it is not critical. Repeat until all layers are in place and wetted out. Allow to fully cure before proceeding.
- Once the resin is fully cured (appropriately 24 hours for epoxy, or 12 hours for vinylester or polyester), carefully remove the masking tape. Using a small sanding block and medium grit paper, or a dremel or die grinder with a small stone, carefully sand down any resin bubbles that are standing proud of the outer surface of the side cover.
- If there are any unsightly transitions between the outer surface of the side cover and the blister, sand the outer surfaces of the blister and side cover with medium grit paper and apply a thin layer of body filler to smooth the transitions. Shape and sand the body filler to a smooth line. Repeat thin layers of body filler as needed to get the desired smooth transition line, then sand and prep for painting.
- Prime and paint as desired.

Contact Information

Honda Performance Development, Inc.
25145 Anza Drive
Santa Clarita, CA 91355
661-294-7300

Honda Racing Line
grmsadmin@hra.com
Phone: 661-702-7777
Fax: 661-294-7367